Accommodations Toolkit

Speech-to-Text: Research

This fact sheet on **speech-to-text** is part of the *Accommodations Toolkit* published by the National Center on Educational Outcomes (NCEO). It summarizes information and research findings on speech-to-text as an accommodation.This toolkit also contains a summary of states' accessibility policies for speech-to-text (/nceo/accommodations-toolkit/speech-to-text-policies).

What is speech-to-text? Speech-to-text, sometimes called speech recognition, is the use of a software program to accommodate students when writing. A person dictates words through a microphone connected to a computer that converts the spoken words into written digital text, while providing visual feedback on a monitor (Lee, 2011; MacArthur & Cavalier, 2004; McCollum et al., 2014; Noakes, 2017; Noakes et al., 2019; Quinlan, 2004).

What are the research findings on who should use this accommodation? Speech-to-text has been shown to improve writing performance in elementary students with specific learning disabilities and emotional disturbance (McCollum, 2014), secondary students with learning disabilities (MacArthur & Cavalier, 2004) and intellectual disabilities (McCollum, 2014), and elementary and secondary students with traumatic brain injuries (Noakes, 2017; Noakes et al., 2019). Overall, the research reviewed showed that speech-to-text can be useful for some students with disabilities.

What are the research findings on implementation of speech-to-text? Six studies were located that addressed speech-to-text as an accommodation in writing assessments.

- Five studies compared use of speech-to-text and handwriting for students with a specific disability. In general, all five studies found that written text was longer and had fewer mechanics errors, such as spelling, when speech-to-text was used. The results from a study of elementary and secondary students with traumatic brain injury, including those whose disabilities affected fine motor handwriting skills, found that students who used speech-to text had a significant increase in the total words written, a higher percentage of words correctly spelled, and correct writing sequences compared to handwritten text (Noakes, 2017, 2019). Another study compared the written essays of secondary students with and without learning disabilities (LD) (MacArthur and Cavalier, 2004). Secondary students with LD had better writing quality with fewer word errors when using speech-to-text when compared to the handwritten essays. There were no differences in quality for students without LD. Similarly, another study of secondary students with LD (which also included other students with lower writing fluency), found that the students produced significantly more words and had fewer errors than when with handwritten narratives (Quinlan, 2004). A study that investigated the use of speech-to-text with elementary students with LD, found that the use of speech-to-text increased students' writing fluency as measured by more words, longer sentences, and improved mechanics (i.e., spelling, punctuation) (Lee, 2011). The same study (Lee,2011) found that for secondary students with LD, there was a greater improvement in writing quality as measured by sentence structure complexity and story structure level development with either writing mode than for the elementary students.
- Speech-to-text used by elementary and secondary students with various disabilities, which included emotional disturbance, intellectual disabilities, and LD had a positive effect. All students used more words, more multisyllabic words, and followed an appropriate writing sequence with improved spelling and punctuation, but the effect was greatest for students with specific learning disabilities (McCollum et al., 2014).

What perceptions do students and teachers have about speech-to-text? There were no studies identified that examined teachers' perspectives. Two studies examined students' perceptions regarding the use of speech-to-text.

- In one study most high school students with LD had a positive view of speech-to-text (MacArthur & Cavalier, 2004). Students preferred to write using speech-to-text as compared to using a scribe or handwriting their essays. Students' reasons for their preferences included increased speed, helped with spelling, enjoyable to use, and helped to get their thoughts down. Students did not like that speech-to-text sometimes made mistakes in word recognition, the time it took to correct errors, and the difficulty to initially learn the program. Overall, most said they would recommend it to friends.

- In a second study, a survey of elementary and secondary students with various disabilities, found that the students had positive to neutral attitudes toward writing using speech-to-text (McCollum, 2014). The results suggested that students' use of speech-to-text software may reduce the cognitive load in writing for students with disabilities.

What have we learned overall? Speech-to-text is beneficial for some students with disabilities, including those with fine motor impairments that affect handwriting, across grade levels. Overall, students produced longer written text with fewer errors. However, speech-to-text is more effective for improving writing quality for secondary students compared to elementary students because they do more in-depth writing using more complex sentences, advanced vocabulary, and greater narrative development. Students generally have positive perceptions of speech-to-text and believe that it that facilitates greater independence from their reliance on a human scribe. The increasing use of technology and the availability of speech-to-text software programs make implementation of speech-to-text a more feasible option for students than in the past.

Footnotes

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Research on speech-to-text summarized here is also available in NCEO's searchable *Accommodations for Students with Disabilities Bibliography* (https (https://nceo.info/Resources/bibliographies)://nceo.info/Resources/bibliographies (https://nceo.info/Resources/bibliographies)) and in NCEO syntheses of research from 1999 through 2017 (see summaries for: 1999–2001 (https://nceo.umn.edu/docs/OnlinePubs/TechReport34.pdf), 2002–2004 (https://nceo.umn.edu/docs/OnlinePubs/Tech45/Technical45.pdf), 2005–2006 (https://nceo.umn.edu/docs/OnlinePubs/Tech47/TechReport47.pdf), 2007–2008 (https://nceo.umn.edu/docs/OnlinePubs/Tech56/TechnicalReport56.pdf), 2009–2010 (https://nceo.umn.edu/docs/OnlinePubs/Tech65/TechnicalReport65.pdf), 2011–2012 (https://nceo.umn.edu/docs/OnlinePubs/Synthesis94/Synthesis94.pdf), 2013–2014 (https://nceo.umn.edu/docs/OnlinePubs/Report402/NCEOReport402.pdf), 2015–2016 (https://nceo.umn.edu/docs/OnlinePubs/NCEOReport412.pdf), 2017 (https://nceo.umn.edu/docs/OnlinePubs/NCEOReport418.pdf), 2018 (https://nceo.umn.edu/docs/OnlinePubs/NCEOReport423.pdf), 2019 (https://nceo.umn.edu/docs/OnlinePubs/NCEOReport433.pdf). See the reports and online bibliography for additional information about the criteria used to identify studies included in this fact sheet.

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